

Product Review

Yaesu FT5DR VHF/UHF Analog/Digital Transceiver

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It's fair to describe Yaesu's FT5DR as the successor to their popular FT3DR handheld transceiver. Like the FT3DR, this is a dual-band VHF/UHF radio that offers analog FM voice and digital C4FM. It is like the FT3DR in many other ways as well, but it also includes several refinements.

The transmit ranges are 144 to 148 MHz and 430 to 450 MHz, which is to be expected. What's unexpected is the astonishing receive coverage — as close to "dc to daylight" as you're likely to find in a handheld transceiver.

Receive coverage is split between two bands, which you can select with the front panel A/B button. See Table 2.

The FT5DR features two independent receivers. This means you can monitor any two A/B band frequencies simultaneously.

The FT5DR offers a hefty 5 W maximum RF output, but you can reduce the output level to as little as 300 mW to help conserve battery power. Speaking of the battery, Yaesu includes a 2200 mAh lithium-ion battery with the FT5DR. I found the battery more than adequate for a full day of frequent use, even when the output was set to 5 W.

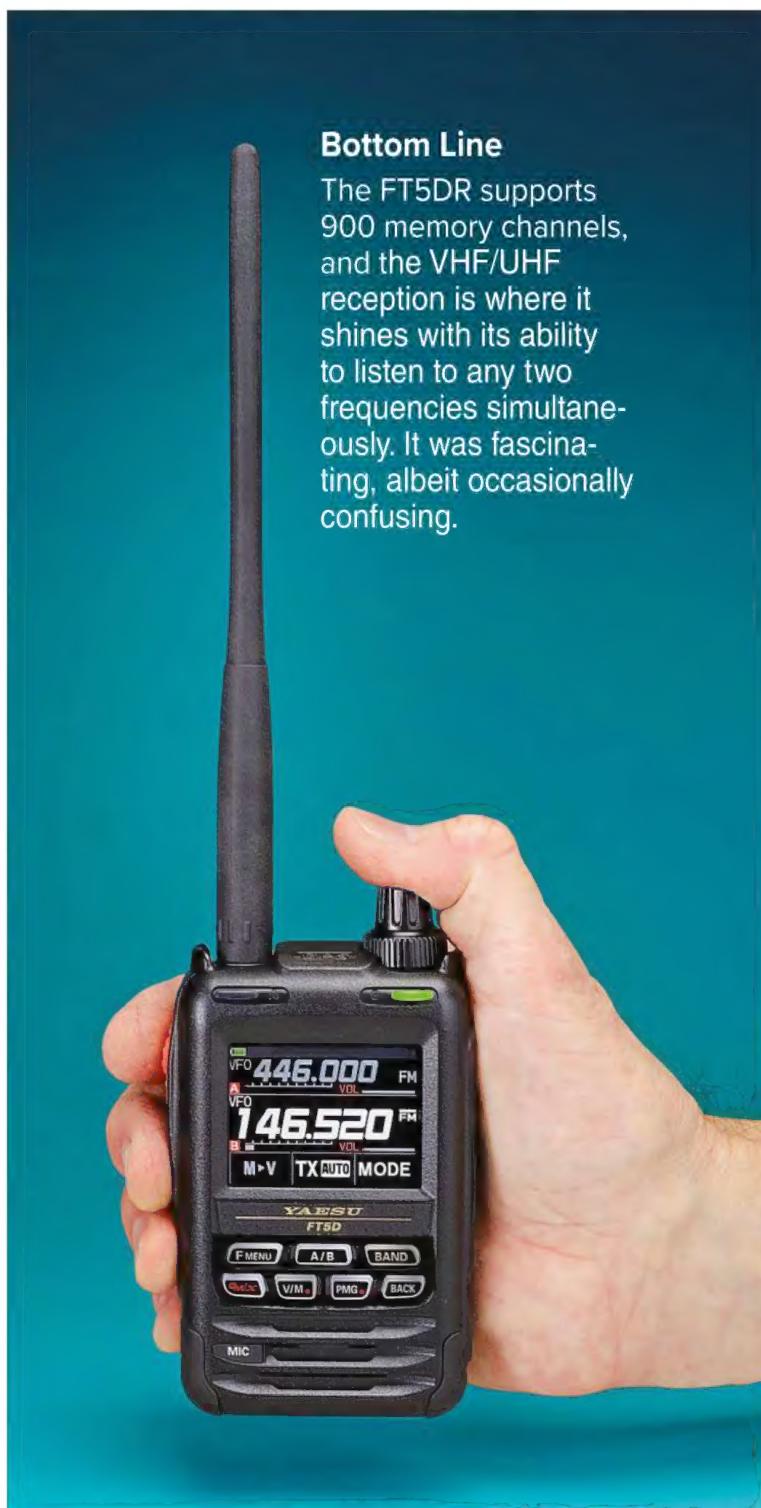
Physical Attributes

The FT5DR is compact at approximately $2.5 \times 4 \times 1.5$ inches, but I'd stop short of calling it "tiny." It fit comfortably within my shirt pocket, although with a weight of almost 10 ounces, I was always aware of its presence there.

One of the most striking visual aspects of the FT5DR is its LCD display screen. The display is bright and crisp, making it easy to see in any environment. There is a power-saving function that dims the screen after a few seconds of inactivity, but operating any control restores the screen to full brightness.

Bottom Line

The FT5DR supports 900 memory channels, and the VHF/UHF reception is where it shines with its ability to listen to any two frequencies simultaneously. It was fascinating, albeit occasionally confusing.



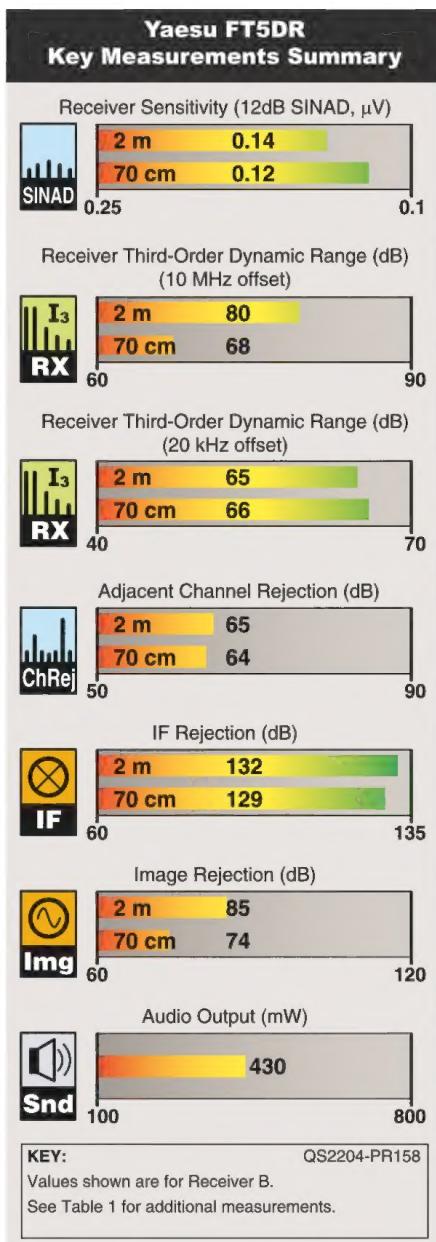


Table 1
Yaesu FT5DR, serial number 1J021030

Manufacturer's Specifications

Frequency coverage: Receiver A, 0.520 – 999.995 MHz (cellular blocked); Receiver B, 108 – 579.9995 MHz. Transmit: 144 – 148 and 430 – 450 MHz.

Modes: FM, Data, C4FM; AM, and WFM only.

Power requirements, 7.2 V dc battery power: Receive, 180 mA (mono band receive); 220 mA (dual band receive); 110 mA (mono band standby); 145 mA (dual band standby); 74 mA (standby, battery saver on). GPS on, additional 15 mA. Digital mode, additional 3 mA. Transmit, 1.6 A (5 W, 144 MHz), 1.9 A (5 W, 430 MHz). Auto power off, 600 μ A.[†]

Receiver

Sensitivity: AM, 10 dB SN: 3 μ V (0.52 – 30 MHz), 1.5 μ V (108 – 137 MHz). WFM, 12 dB SINAD: 1.5 μ V (76 – 108 MHz). FM, 12 dB SINAD: 0.35 μ V (30 – 54 MHz), 1 μ V (54 – 76 MHz), 0.2 μ V (137 – 140 MHz), 0.16 μ V (140 – 150 MHz), 0.2 μ V (150 – 174 MHz), 1 μ V (174 – 222 MHz), 0.5 μ V (222 – 225 and 300 – 350 MHz), 0.2 μ V (350 – 400 MHz), 0.18 μ V (400 – 470 MHz), 1.5 μ V (470 – 580 MHz), 3 μ V (580 – 800 MHz), 1.5 μ V (800 – 999 MHz).

FM two-tone, third-order IMD dynamic range: Not specified.

FM two-tone, second-order IMD dynamic range: Not specified.

Adjacent-channel rejection: Not specified.

Measured in ARRL Lab

Receive and transmit, as specified. (Cellular frequencies 824 – 849, 869 – 894, 940 – 965.1, and 985 – 999.995 MHz are blocked.)

As specified. (AM, 0.52 – 30 and (receive 108 – 137 MHz; WFM, 76 – 108 MHz.)

External power, at 7.4 V dc:
Receive, 160 mA (mono band receive); 198 mA (dual band receive); 125 mA (mono band standby); 135 mA (dual band standby); GPS on, additional 15 mA.
Transmit (Hi/L3/L2/L1):
146 MHz, 1.45/1.0/0.66/0.5 A
440 MHz, 1.84/1.45/0.87/0.65 A
Power off: 500 μ A.

Receiver Dynamic Testing*

Receiver A: AM, 10 dB S+N/N, 1.0 μ V (1 MHz), 0.7 μ V (3.9 and 14 MHz), 0.8 μ V (120 MHz).
FM, 12 dB SINAD, 0.15 μ V (52 MHz), 0.14 μ V (146 MHz), 0.15 μ V (162.4 MHz), 0.17 μ V (222 MHz), 0.12 μ V (440 MHz), 0.30 μ V, (902 MHz).
Receiver B: FM, 12 dB SINAD, 0.14 μ V (146 MHz), 0.15 μ V (162.4 MHz), 0.22 μ V (222 MHz), 0.15 μ V (440 MHz).

Receiver A, 20 kHz offset:
62 dB (146 MHz), 54 dB (440 MHz)
10 MHz offset: 73 dB (146 MHz), 61 dB (440 MHz).

Receiver B, 20 kHz offset:
65 dB (146 MHz), 66 dB (440 MHz).
10 MHz offset: 80 dB (146 MHz), 68 dB (440 MHz).

Receiver A: 82 dB (146 MHz), 79 dB (440 MHz).

Receiver B: 82 dB (146 MHz), 79 dB (440 MHz).

20 kHz offset: Receiver A, 66 dB (146 MHz), 64 dB (440 MHz).
Receiver B, 65 dB (146 MHz), 64 dB (440 MHz)

Screen functionality isn't limited to displaying information. This is a touchscreen that you can use to quickly access various functions, including the menu system. The screen is 1½ × 1¼ inches but even my oversized fingers had no difficulty with it. In fact, I soon found that I used the touchscreen more often than the front-panel buttons.

At the top of the radio, you'll find two concentric knobs. The tall knob is primarily used to adjust the frequency of the active band, as well as

certain selections within the menu system. You also can enter frequencies directly through a keypad display on the touchscreen.

The bottom knob (a ring, actually) is used to adjust the volume level of the active band. If you press and hold the SQUELCH button on the side of the radio, the volume bar on the screen switches to a yellow squelch bar and you can twist the ring to set the squelch level.

On the right-hand side of the FT5DR (as the radio is facing you), there are

several ports hidden beneath a protective rubber cap. While there is a small screw you can use to remove the cap completely, I found it easy to just lift one end of the cap or the other, to access the port I wanted. The ports include a microphone/headset jack, a USB data jack, a slot for a microSD memory card, and a coaxial dc power jack. The protective cap is part of what gives the FT5DR its IPX7 rating, meaning that it can survive being submerged in a meter of water for at least 30 minutes.

Manufacturer's Specifications

Spurious response: Not specified.

Squelch sensitivity: Not specified.

S-meter sensitivity: Not specified.

Audio output: at 10% THD, 300 mW with 8 Ω load at 7.4 V dc (external speaker).

Transmitter

Power output (Hi/Mid3/Low2/Low1):
5.0/2.5/1.0/0.3 W with SBR-14LI
battery pack or 13.8 V dc external input.

Spurious signal and harmonic suppression:
≥60 dB (Hi/L3), ≥50 dB (L2/L1).

Transmit-receive turnaround time (PTT
release to 50% of full audio output):
Not specified.

Receive-transmit turnaround time
(TX delay): Not specified.

Size (height, width, depth): 3.9 × 2.4 × 1.3 inches (excluding protrusions).
Antenna length: 7 inches. Weight: 10 ounces (with battery and antenna).

*SBR-14LI 7.2 V, 2,200 mAh Li-ion battery supplied. Replacement SB-14LI, \$80.
FNB-101LI 7.4 V, 1,100 mAh Li-ion battery, \$53. FBA-39 AA-cell holder, \$32.
CD-41 rapid charger cradle, \$38.

*DV not tested; C4FM FDMA signal generator was not available.

Measured in ARRL Lab

IF rejection, Receiver A: 92 dB (146 MHz),
121 dB (440 MHz). Receiver B: 132 dB
(146 MHz), 129 dB (440 MHz).

Image rejection, Receiver A:
89 dB (146 MHz), 56 dB (440 MHz).
Receiver B: 85 dB (146 MHz),
65 dB (440 MHz).

At threshold, Receiver A: 146 MHz,
0.35 μV (min), 0.84 μV (max);
440 MHz, 0.1 μV (min), 0.3 μV (max).
Receiver B, 146 MHz, 0.2 μV (min),
0.35 μV (max), 440 MHz, 0.13 μV (min),
0.28 μV (max).

S-9 indication, Receiver A: 5.3 μV
(146 MHz), 2.98 μV (440 MHz).
Receiver B: 3.98 μV (146 MHz),
1.78 μV (440 MHz).
430 mW into 8 Ω at 10% THD.
THD 3.5% at 1 V_{RMS}. (Same
values for either Receiver A or B.)

Transmitter Dynamic Testing

Battery power, 7.4 V dc:
146 MHz: 5.1/2.8/0.90/0.42 W
440 MHz: 5.1/2.5/0.71/0.32 W
External 13.8 V dc input:
146 MHz: 5.3/2.8/0.88/0.41 W
440 MHz: 5.3/3.1/0.91/0.37 W

>70 dBc. Meets FCC requirements.

Squelch on, S-9 signal, Receiver A:
144 MHz, 56 ms; 440 MHz, 61 ms
Receiver B: 144 MHz, 58 ms;
440 MHz, 55 ms;

Receiver A: 144 MHz, 18 ms,
440 MHz, 19 ms. Receiver B:
144 and 440 MHz, 17 ms.

Table 2

Yaesu FT5DR A and B Receive Coverage

A Band

0.5 – 1.8 MHz (AM broadcast)
1.8 – 30 MHz (AM)
30 – 108 MHz (FM broadcast)
108 – 137 MHz (AM aeronautical)
137 – 174 MHz (FM)
174 – 222 MHz (FM)
222 – 420 MHz (FM)
420 – 470 MHz (FM)
470 – 800 MHz (FM)
800 – 999.995 MHz (FM)

B Band

108 – 137 MHz (AM aeronautical)
137 – 174 MHz (FM)
174 – 222 MHz (FM)
222 – 420 MHz (FM)
420 – 470 MHz (FM)
470 – 580 MHz (FM)

You can switch in an attenuator when
the radio is operated in areas of strong
RF signals from other transmitters.
An attenuator can significantly reduce
intermodulation and other types of
receiver overload common in large
cities or areas where there are a
number of nearby transmitters.

from local ham repeaters to police
and fire dispatchers, to aviation
traffic, to FM broadcast signals
(monaural only). The ability to listen
to any two frequencies simultane-
ously was fascinating, albeit occa-
sionally confusing.

The FT5DR supports 900 memory
channels to store the frequencies of
whatever signals you encounter. It is
also worth noting that the memory
lineup comes with 89 channels pre-
programmed with frequencies used by
the most powerful shortwave broad-
casters, along with 57 preprogrammed
marine radio frequencies.

Tuning In

As soon as I had the rig up and running, I was eager to experience the FT5DR's extensive receiving range. Starting in the AM broadcast band, I listened to several local stations. The audio was crisp and clear, and the sensitivity seemed good even though I was only using the supplied rubber duck antenna.

As I tuned into the shortwave bands, the antenna quickly demonstrated its weakness. It shouldn't come as a surprise that such a short antenna would be a poor performer at these

frequencies. The FT5DR's front end is sensitive, so much so that Yaesu included an attenuator function to reduce the gain when necessary, but with the supplied antenna I could still hear only the strongest HF signals. I tried attaching the FT5DR to my outdoor antenna system and immediately regretted it — the receiver was totally overwhelmed by local broadcast signals. Even activating the attenuator was of little help.

But VHF/UHF reception is where the FT5DR shines. I sampled everything

Touch & Go Operation

One particularly cool memory function is the Primary Memory Group activity monitor (PMG). These are five memory slots that you can dedicate to the frequencies you use most often. Let's say you tend to hang out on repeaters at 147.36 and 146.61 MHz, and you also enjoy simplex contacts at 146.52 MHz. You can "register" each of these frequencies by pressing and holding the front-panel PMG button as you tune to each one. With registration complete,



Figure 1 — The FT5DR's band scope in action.



Figure 2 — Accessing the Yaesu WIRES-X network through the KB1AEV Fusion repeater.



Figure 3 — Watching local APRS activity on the FT5DR's colorful LCD screen.

you briefly press the **PMG** button again and the FT5DR will display activity on all three frequencies in the form of vertical bars labeled **P1**, **P2**, and **P3** (you can register up to five frequencies). Whenever activity takes place, the bars change color and expand in height. Tap on any of the bars and you're instantly transported to that frequency.

The same Touch & Go functionality available in the Primary Memory Group Activity Monitor applies to the CAM (Channel Activity Monitor). That is, you can register up to five channels for each of the 10 CAM group memories, and any activity taking place at those frequencies will be displayed as vertical bars on the screen. Touch any bar and the radio will immediately switch to that channel.

Other Functions

Like many higher-end handheld models, the FT5DR offers a band scope. I've usually been underwhelmed with band scopes on handheld rigs, but the FT5DR is an exception (see Figure 1). Thanks to the sharp, colorful display, the scope is easy to see. With the touch-screen function, the band scope is even easier to use. If you see a spike of activity, a quick tap on the screen will put you on frequency.

Of course, the FT5DR includes flexible scanning functions. My favorite was the memory scan. I could choose which memory groups I wanted to browse and then activate the scan. There is also a programmable VFO scan, which is handy when you want to explore within a certain frequency range.

When you're eavesdropping with the FT5DR, you can make audio recordings of anything you happen to stumble across. Not only that — you can also record your own transmissions. To use the recording feature, you'll need a microSD memory card (the FT5DR can

support cards with capacities as great as 32 GB) and insert it into the slot on the side of the radio. You must enter the menu system to start or stop recording, and the resulting WAV audio files will then be stored directly onto the card. You can play the files through the FT5DR or remove the microSD card and play the files on your computer instead.

On the Air

Analog FM operating was a pleasure with the FT5DR. Receive audio didn't seem as "pinched" or tinny as what I encountered when using the FT3DR. On the contrary, it seemed clear and full-bodied. This is no doubt due to the larger speaker and the additional audio output power (1 W).

The FT5DR offers voice-operated transmit/receive switching (VOX), which is particularly convenient during mobile operations. The transceiver takes this idea a step further, however, by including wireless Bluetooth functionality as standard equipment. Yaesu sells a Bluetooth headset, but I opted to try another model that I use around my office. It paired easily with the FT5DR and, with the **VOX** active, I only had to speak to begin transmitting. Needless to say, you have to be careful about what you say when the **VOX** is on. Strongly worded criticisms of your fellow drivers come to mind!

And then there is digital with Yaesu's implementation of C4FM technology and their System Fusion repeaters. I have only a couple of Fusion repeaters nearby, but was able to reach both with the FT5DR. With the radio's automatic mode sensing enabled, it would instantly switch between C4FM and analog FM, depending on the nature of the received signal. I heard mostly analog FM signals on the nearest Fusion repeater at first, but suddenly I picked up the unmistakable sound of a digital transmission, followed by clear audio as the FT5DR

switched to C4FM and began decoding the data. The operator's call sign appeared on the screen as well.

One of the Fusion repeaters in my vicinity is also a node connected to Yaesu's WIRES-X internet-linking network. WIRES-X allows you to enjoy voice conversations with other WIRES-X users throughout the world. To access the repeater's internet link, all I had to do was press and hold the **GM/X** button. The FT5DR transmitted a brief access signal and, a couple of seconds later, I was connected to the node and the global internet network beyond (see Figure 2).

APRS

Like the announcer on every annoying television commercial, I'm tempted to write, "But wait! There's more!"

In the FT5DR, "more" means a built-in Global Positioning System (GPS) receiver supporting the ability to send and receive data from the Automatic Packet Reporting System (APRS) network. To use the APRS features, you'll need to download a separate manual from the Yaesu website (www.yaesu.com) because APRS is a world unto itself.

The FT5DR packet modem operates at either 1200 or 9600 baud. It can send and receive APRS information and display the results (see Figure 3). I have a considerable amount of APRS activity in my area on 144.39 MHz, so it was easy to set up the FT5DR's APRS features and join the fray. With the radio in my car, my icon appeared on the APRS network as I drove around town. The radio frequently chimed to tell (and show) that it had decoded other APRS signals on the channel.

When reviewing my travels on an APRS tracking site on the web, it was obvious that the FT5DR's GPS receiver rarely (if ever) lost its satellite lock. My positions were duly reported to the local network and beyond. If you want to record your journeys, the FT5DR adds the ability to save your GPS tracks to the microSD card.

Memory Programming

You can use the manufacturer's free *ADMS-14* software to program the FT5DR's memories. The software and manual can be downloaded from the Yaesu website.

The software requires the Yaesu SCU-19 PC connection cable, which connects the radio to a USB port on your computer. The SCU-19 cable is not supplied with the radio but is among those included in the SCU-39 accessory cable kit. Be sure to install the driver before

connecting the cable to the computer. If you use a COM port instead of a USB, you will need the optional CT-169 cable.

Even without a cable, you have the option to read and write memory information to the microSD card instead of making a USB connection to your computer, but you'd have to shuttle the card between the radio and your computer (and the computer would need a microSD reader).

Since I have the SCU-19 cable, I find it simpler to just connect directly to the PC. When I turn the FT5DR on, it communicates with the computer and establishes a specific COM port. After the computer recognizes the FT5DR as a valid device, I note the COM port number so I can enter it into the *ADMS-14* software.

If you'd prefer a more full-featured software application, consider the YPS-5TD package from RT Systems at www.rtsystemsinc.com.

Conclusion

While some may balk at the FT5DR's price tag, keep in mind that this radio includes everything except the proverbial kitchen sink. I would have needed several more pages to cover all the FT5DR has to offer; this review just skims the surface. As an example, I didn't mention (or test) the ability of the rig to become a portable WIRES-X node by adding little more than a \$65 USB cable kit, software, and a computer. Nor did I get a chance to try the optional camera microphone (yes, the FT5DR can send images).

If you have a System Fusion repeater close by — especially one that is connected to the WIRES-X network — and want to enjoy more than 900 MHz of receive coverage, the FT5DR is worth a look.

Manufacturer: Yaesu USA, 6125 Phyllis Dr., Cypress, CA 90630; www.yaesu.com. **Price:** FT5DR, \$480.

